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Statistical Analysis of the Annual Average F.O.B. Prices of Canned Clingstone Peaches, 1924-25 to 1948-49

by
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Sidney Hoos[1/]

The purpose of this report is to present the results of a statistical analysis of the major factors which have influenced the annual average f.o.b. prices received for canned clingstone peaches by canners in California from 1924-25 through 1948-49. The war years 1941-42 through 1945-46 were excluded from the analysis because of the abnormal conditions which prevailed then, such as federal price control; and 1946-47 was excluded because a large proportion of the canner shipments that year went into the refilling of the supply pipe line rather than into consumers' hands.

In this analysis the average relationships which prevailed between the f.o.b. prices of canned clingstone peaches and three factors were measured. These three factors are (1) total domestic shipments of California canned peaches, including both clingstones and freestones, (2) index of nonagricultural income payments in the United States, and (3) adjusted index of prices of competing canned fruits.

The average relations between the f.o.b. price and each of the independent variables are shown graphically by the lines in figure 1. Expressed in numerical terms these relations are as follows:

(a) A change of one million cases in domestic shipments of California canned peaches, with nonagricultural income and competing canned fruit prices held constant, was on the average accompanied by a change in the opposite direction of 13 cents a case in the f.o.b. price of canned clingstone peaches. This relation is shown by the diagonal line in panel A of figure 1.

1/ Associate Professor of Agricultural Economics, Associate Agricultural Economist in the Experiment Station, and Associate Agricultural Economist on the Giannini Foundation.

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The purpose of this report is to present the results of a statistical analysis of the major factors which have influenced the annual average f.o.b. prices received for canned clingstone peaches by canners in California from 1924-25 through 1948-49. The war years 1941-42 through 1944-46 were excluded from the analysis because of the abnormal conditions which prevailed then, such as federal price control; and 1946-47 was excluded because a large proportion of the canner shipments that year went into the refilling of the supply pipe line rather than into consumers' hands.

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The average relations between the f.o.b. price and each of the independent variables are shown graphically by the lines in figure 1. Expressed in numerical terms these relations are as follows:

(a) A change of one million cases in domestic shipments of California canned peaches, with nonagricultural income and competing canned fruit prices held constant, was on the average accompanied by a change in the opposite direction of 15 cents a case in the f.o.b. price of canned clingstone peaches. This relation is shown by the diagonal line in panel A of figure 1.

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(b) A change of 10 per cent in the index of nonagricultural income in the United States, with domestic shipments of California canned peaches and prices of competing canned fruits held constant, was on the average accompanied by a change in the same direction of 34 cents a case in the f.o.b. price of California canned clingstones. This relation is shown graphically in panel B of figure 1.

(c) A change of 10 points in the adjusted index of prices of competing canned fruits, with domestic shipments of California canned peaches and nonagricultural income held constant, was on the average accompanied by a change in the same direction of 26 cents a case in the f.o.b. price of California canned clingstones. This relation is shown by the diagonal line in panel C of figure 1.

Differences between the actual prices and those explained by the correlation analysis are given in table 4, column 3. These differences are plotted as deviations from the net regression lines in panels A, B, and C of figure 1.

It will be noted that the actual f.o.b. price received by California canners for canned clingstone peaches in 1948-49 was 16 cents a case less than that expected from the analysis using the most recently available figures on domestic shipments of California canned peaches, index of nonagricultural income, and adjusted index of prices of competing canned fruit during 1948-49.

As a check upon the analysis with price as the dependent variable, a correlation analysis was also made in which quantity of domestic shipments was taken as the dependent variable. In this latter analysis the emphasis is shifted from the factors influencing the f.o.b. prices of California canned clingstone peaches to the factors influencing the California domestic shipments of canned peaches. Total movement of peaches out of California canners' hands minus United States exports is assumed to equal domestic shipments of canned peaches by California canners.

(b) A change of 10 per cent in the index of nonagricultural income in the United States, with domestic shipments of California canned peaches and prices of competing canned fruits held constant, was on the average accompanied by a change in the same direction of 34 cents a case in the f.o.b. price of California canned clingstones. This relation is shown graphically in panel B of figure 1.

(c) A change of 10 points in the adjusted index of prices of competing canned fruits, with domestic shipments of California canned peaches and nonagricultural income held constant, was on the average accompanied by a change in the same direction of 26 cents a case in the f.o.b. price of California canned clingstones. This relation is shown by the diagonal line in panel C of figure 1.

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The average relations between domestic shipments of canned peaches and each of the three variables--f.o.b. prices of California canned clingstone peaches, index of nonagricultural income, and adjusted index of competing canned fruit prices--may be summarized as follows:

(a) On the average a change of $1.00 a case in the f.o.b. price of California canned clingstone peaches, with nonagricultural income and competing canned fruit prices held constant, was accompanied by a change in the opposite direction of 4.853 million cases in California canners' domestic shipments of canned peaches.

(b) A change of 10 per cent in the index of nonagricultural income, with the f.o.b. price of California canned clingstone peaches and prices of competing canned fruits held constant, was on the average accompanied by a change in the same direction of 1.735 million cases in California canners' domestic shipments of canned peaches.

(c) A change of 10 points in the adjusted index of prices of competing canned fruits was, with the f.o.b. price of California canned clingstones and nonagricultural income held constant, on the average accompanied by a change in the same direction of 1.022 million cases in California canners' domestic shipments of canned peaches.

The average relations between domestic shipments of canned peaches and each of the three variables--f.o.b. prices of California canned clingstone peaches, index of nonagricultural income, and adjusted index of competing canned fruit prices--may be summarized as follows:

(a) On the average a change of $1.00 a case in the f.o.b. price of California canned clingstone peaches, with nonagricultural income and competing canned fruit prices held constant, was accompanied by a change in the opposite direction of 4.838 million cases in California canners' domestic shipments of canned peaches.

(b) A change of 10 per cent in the index of nonagricultural income, with the f.o.b. price of California canned clingstone peaches and prices of competing canned fruits held constant, was on the average accompanied by a change in the same direction of 1.735 million cases in California canners' domestic shipments of canned peaches.

(c) A change of 10 points in the adjusted index of prices of competing canned fruits was, with the f.o.b. price of California canned clingstones and nonagricultural income held constant, on the average accompanied by a change in the same direction of 1.022 million cases in California canners' domestic shipments of canned peaches.

Technical Note.--With price as the dependent variable and the three factors mentioned above as the independent variables, the multiple linear regression equation fitted by the method of least square to the series covering the years 1924-25 through 1948-49 (excluding 1941-42 through 1946-47) is:

$$(1) \quad X_1 = -15.184943 - \underset{(5.101170)}{0.000131X_2} + \underset{(25.709535)}{8.193997\log_{10}X_3} + \underset{(9.484902)}{0.025696X_4};$$

where X_1 is the annual average f.o.b. price of California canned clingstone peaches (in dollars per case);

X_2 is the domestic shipments of California canned peaches, including both clingstones and freestones (in units of 1,000 cases);

X_3 is the index of nonagricultural income in the United States (1935-1939 = 100);

X_4 is the adjusted index of prices of competing canned fruits (1935-1939 = 100);

the figures in parentheses are t-ratios of the net regression coefficients;

the adjusted coefficient of multiple correlation $\bar{R}_{1.234} = 0.988$;

the adjusted coefficient of multiple determination $\bar{R}^2_{1.234} = 0.977$.

With domestic shipments as the dependent variable, the multiple linear regression equation is:

$$(2) \quad X_2 = -72,253.015621 - \underset{(5.101170)}{4,852.602786X_1} + \underset{(5.764665)}{41,907.401611\log_{10}X_3} + \underset{(2.936110)}{102.162817X_4};$$

the adjusted coefficient of multiple correlation $\bar{R}_{2.134} = 0.944$;

the adjusted coefficient of determination $\bar{R}^2_{2.134} = 0.891$.

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TABLE 1

Statistical Analysis of the Annual Average
F.O.B. Prices of Canned Clingstone Peaches
Variables Used in the Analysis

Year June through May	F.O.B. price canned clingstone peaches	Domestic shipments of California canned peaches	Index of nonagricultural income (1935-1939=100)	Adjusted index of prices of competing canned fruits (1935-1939=100)
	1	2	3	4
	dollars per case	thousand cases	per cent	per cent
1924-25	4.21	5,637	103.9	147.3
1925-26	3.78	8,511	112.7	123.3
1926-27	3.66	9,046	115.3	118.0
1927-28	3.17	11,163	116.2	112.7
1928-29	3.22	10,800	120.7	106.0
1929-30	4.08	7,845	120.2	117.3
1930-31	2.88	9,402	104.4	109.2
1931-32	2.55	6,058	85.5	102.9
1932-33	1.97	8,188	68.1	123.3
1933-34	2.31	7,480	75.5	124.5
1934-35	2.69	8,006	82.1	127.9
1935-36	2.51	8,726	91.0	109.9
1936-37	2.66	9,876	106.5	93.0
1937-38	2.96	7,531	103.3	101.6
1938-39	2.30	10,669	101.0	92.1
1939-40	2.44	9,551	109.6	93.1
1940-41	2.30	12,666	122.1	84.4
1947-48	4.82	15,134	292.1	64.7
1948-49a/	4.90	13,737	312.3	62.4

a/ Preliminary--subject to revision.

Sources of data:

Col. 1: Compiled from reports by canners. Prices are weighted average prices of canned clingstone peaches received by canners, f.o.b. cannery dock, for all grades and sizes of cans on an unadvertised basis. Regular brokerage, cash discount, swell allowance, label allowance, and case allowance are included.

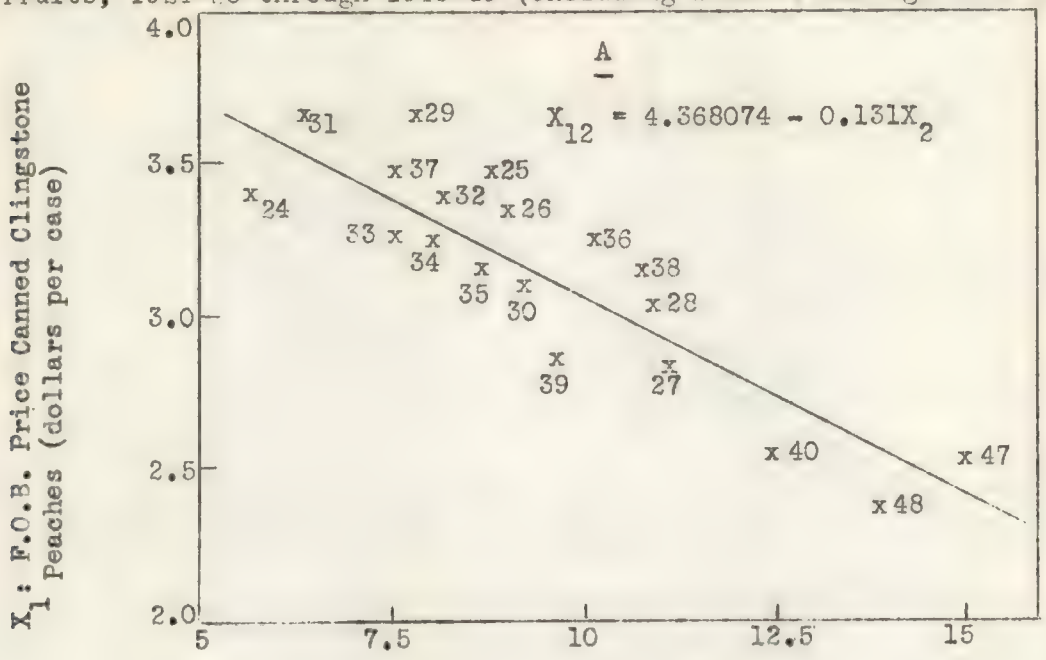
Col. 2: Total shipments minus exports. Total shipments compiled by the Canners League of California and the Canning Peach Industry Board. Figures include both clingstones and freestones on a No. 2½ basis. See table 2.

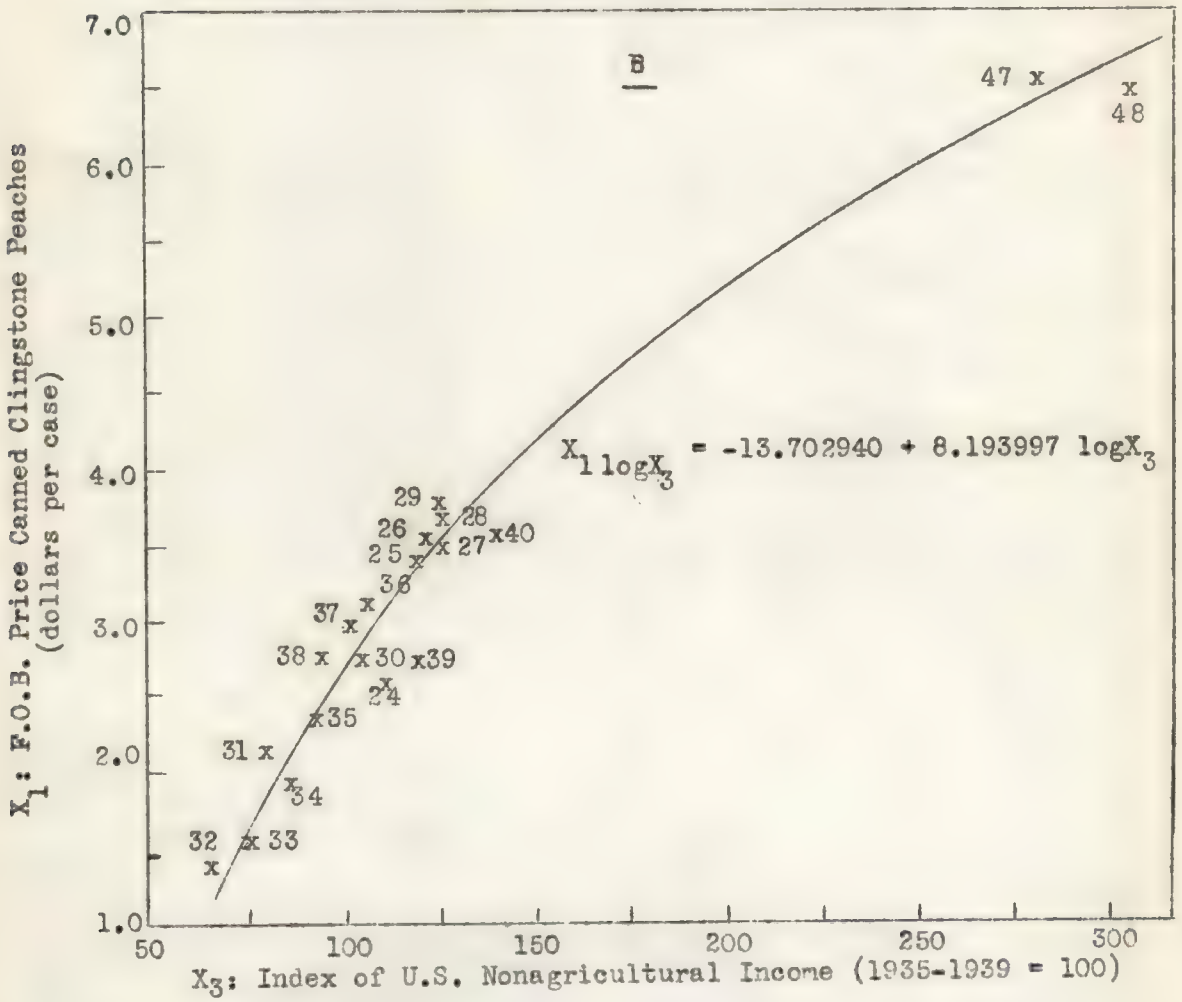
Col. 3: Simple average of the pack-year monthly indices of national income, excluding agricultural income, 1935-1939 average equals 100. Monthly income data compiled from U.S. Dept. of Commerce, Survey of Current Business. Unrevised figures used for months prior to June 1939 and revised income figures used for June 1939 and following months. The revised income data obtained from July 1947 Supplement to Survey of Current Business and later monthly issues. Indexes for April and May 1949 estimated.

Col. 4: For sources and method of construction see table 3.

FIGURE 1

California Canned Clingstone Peaches: Average F.O.B. Prices Received by Canners Related to (A) Domestic Shipments of California Canned Peaches, (B) Index of U.S. Nonagricultural Income, and (C) Adjusted Index of Prices of Competing Canned Fruits, 1924-25 through 1948-49 (excluding 1941-42 through 1946-47).





X_2: Domestic Shipments of California Canned Peaches
($ 000,000 omitted)

X_3: Index of U.S. nonagricultural Income (1947-1949 = 100)

(Figure 1 continued)

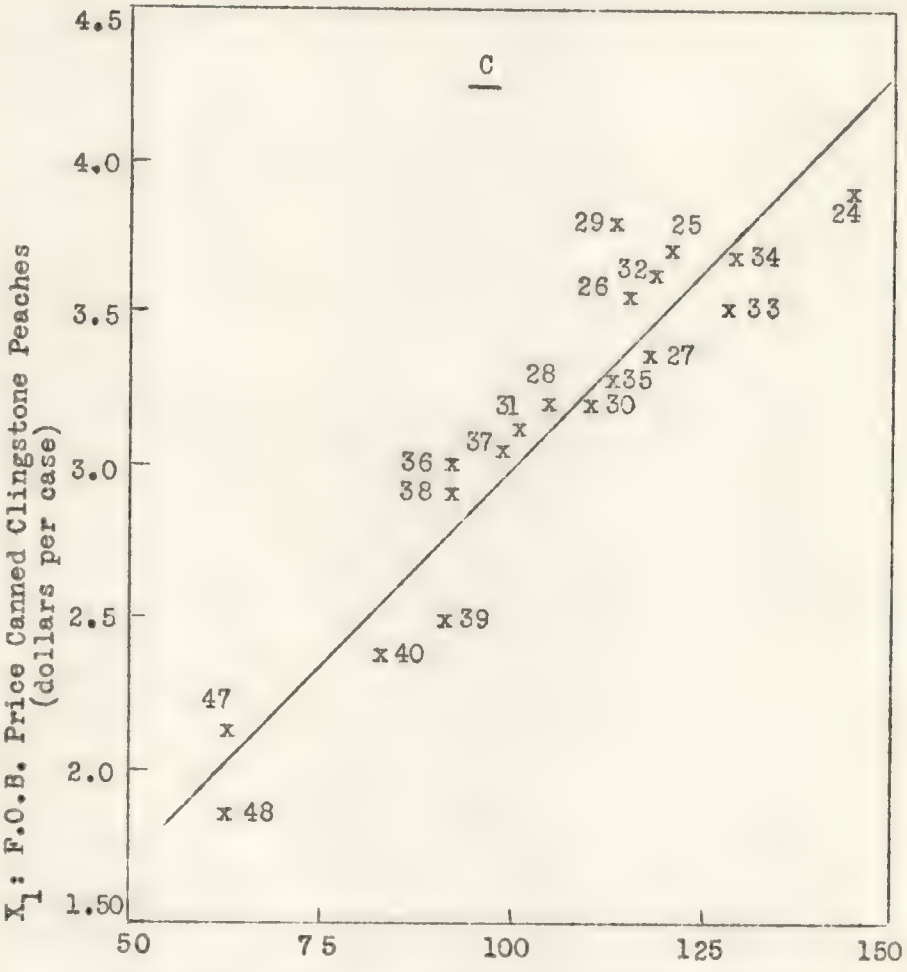


TABLE 2

Shipments of California Canned Clingstone and Freestone Peaches and United States Exports of Canned Peaches

Year June through May	California			United States	California
	Canned clingstone shipments	Canned freestone shipments	Canned peach shipments	Exports	Domestic shipments of canned peaches
	1	2	3	4	5
	thousand cases, No. 2½ basis				
1924-25					5,637
1925-26					8,511
1926-27					9,046
1927-28	12,907	296	13,203	2,040	11,163
1928-29	12,652	310	12,962	2,162	10,800
1929-30	9,204	362	9,566	1,721	7,845
1930-31	10,881	145	11,026	1,624	9,402
1931-32	7,445	82	7,527	1,469	6,058
1932-33	9,881	40	9,921	1,733	8,188
1933-34	9,214	65	9,279	1,799	7,480
1934-35	8,811	321	9,132	1,126	8,006
1935-36	10,757	274	11,031	2,305	8,726
1936-37	10,667	518	11,185	1,309	9,876
1937-38	8,125	677	8,802	1,271	7,531
1938-39	12,287	542	12,829	2,160	10,669
1939-40	10,626	878	11,504	1,953	9,551
1940-41	11,520	1,233	12,753	87	12,666
1941-42	10,568	2,161	12,729		
1942-43	12,926	1,191	14,117		
1943-44	10,739	598	11,337		
1944-45	12,285	337	12,622		
1945-46	12,236	510	12,746		
1947-48	14,518	1,291	15,809	675	15,134
1948-49a/	12,500	1,650	14,150	413	13,737

a/ Preliminary--subject to revision.

Sources of data:

Cols. 1 and 2: Compiled by the Canners League of California and the Canning Peach Industry Board.

Col. 3 : Col. 1 plus col. 2.

Col. 4 : United States Department of Commerce, Monthly Summary of Foreign Commerce of the United States. March-May 1949 exports estimated.

Col. 5 : Col. 3 minus col. 4.

TABLE 3

Construction of Index of Prices of Canned Fruits Competing with Canned Peaches

Year June through May	Prices			Relatives of prices			Indexes		
	Canned Bartlett pears	Canned apricots	Canned Hawaiian pineapples	Canned Bartlett pears	Canned apricots	Canned Hawaiian pineapples	Unadjusted index of competing canned fruit prices	Index of nonagricultural income	Adjusted index of competing canned fruit prices
	1	2	3	4	5	6	7	8	9
	dollars per case	dollars per case	dollars per doz. cans	1935-1939=100			1935-1939=100		
1924-25	5.40	3.91	2.60	180.6	139.4	144.4	153	103.9	147.3
1925-26	5.44	3.72	2.15	181.9	132.7	119.4	139	112.7	123.3
1926-27	4.31	3.85	2.35	144.1	137.3	130.6	136	115.3	118.0
1927-28	4.60	3.97	2.10	153.8	141.6	116.7	131	116.2	112.7
1928-29	4.13	3.67	2.20	138.1	130.9	122.2	128	120.7	106.0
1929-30	4.82	3.97	2.35	161.2	141.6	130.6	141	120.2	117.3
1930-31	3.53	3.32	2.00	118.1	118.4	111.1	114	104.4	109.2
1931-32	2.82	2.64	1.50	94.3	94.2	83.3	88	85.5	102.9
1932-33	2.48	2.23	1.55	82.9	79.5	86.1	84	68.1	123.3
1933-34	2.64	2.37	1.80	88.3	84.5	100.0	94	75.5	124.5
1934-35	3.05	3.47	1.80	102.0	123.8	100.0	105	82.1	127.9
1935-36	2.92	2.93	1.80	97.7	104.5	100.0	100	91.0	109.9
1936-37	2.92	2.75	1.80	97.7	98.1	100.0	99	106.5	93.0
1937-38	3.07	3.02	1.90	102.7	107.7	105.6	105	103.3	101.6
1938-39	2.77	2.55	1.70	92.6	90.9	94.4	93	101.0	92.1
1939-40	3.27	2.77	1.80	109.4	98.8	100.0	102	109.6	93.1
1940-41	3.06	3.23	1.80	102.3	115.2	100.0	103	122.1	84.4
1947-48	7.25	5.33	2.90	242.5	190.1	161.1	189	292.1	64.7
1948-49[a]/	7.37	4.55	3.25	246.5	162.3	180.6	195	312.3	62.4

(Continued on next page)

Table 3 continued.

a/ Preliminary--subject to revision.

Sources of data:

Cols. 1 and 2: Compiled from records of canners. Prices are weighted average prices for all grades and sizes of cans, F.O.B. cannery. Canned Bartlett pear prices for all years are for the Pacific Coast; except 1947-48 is for California canners. Canned apricot prices are for California.

Col. 3: Compiled by S. W. Shear for No. 2½ sliced fancy pineapple, Hawaii, f.o.b. San Francisco from published quotations supplemented by trade information.

Cols. 4, 5 and 6: Prices given in columns 1, 2 and 3 in per cent of their 1935-1939 averages--canned Bartlett pears, $2.990; canned apricots $2.804; canned pineapples, $1.80.

Col. 7: Weighted combination of relatives given in cols. 4, 5, and 6, using following weights: canned Bartlett pears, 3; canned apricots, 2; canned pineapples, 6.

Col. 8: From table 1, col. 3.

Col. 9: Col. 7 as per cent of col. 8

Table 3 continued.

a/ Preliminary--subject to revision.

Sources of data:

Cols. 1 and 2:	Compiled from records of canners. Prices are weighted average prices for all grades and sizes of cans, F.O.B. cannery. Canned Bartlett pear prices for all years are for the Pacific Coast; except 1947-48 is for California canners. Canned apricot prices are for California.
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Col. 8:	From table 1, col. 3.
Col. 9:	Col. 7 as per cent of col. 8

TABLE 4

Actual and Estimated F.O.B. Prices of
California Canned Peaches, 1924-25 to 1948-49
(Excluding 1941-42 through 1946-47)

Year June through May	Actual price	Estimated price	Difference: col. 1 minus col. 2	Percentage difference: col. 3 as % of col. 1
	1	2	3	4
	dollars per case			per cent
1924-25	4.21	4.39	-.18	-4.28
1925-26	3.78	3.68	+.10	2.65
1926-27	3.66	3.56	+.10	2.73
1927-28	3.17	3.17	0	0
1928-29	3.22	3.18	+.04	1.24
1929-30	4.08	3.84	+.24	5.88
1930-31	2.88	2.93	-.05	-1.74
1931-32	2.55	2.50	+.05	1.96
1932-33	1.97	1.93	+.04	2.03
1933-34	2.31	2.42	-.11	-4.76
1934-35	2.69	2.74	-.05	-1.86
1935-36	2.51	2.55	-.04	-1.59
1936-37	2.66	2.52	+.14	5.26
1937-38	2.96	2.94	+.02	0.68
1938-39	2.30	2.21	+.09	3.91
1939-40	2.44	2.67	-.23	-9.43
1940-41	2.30	2.42	-.12	-5.22
1947-48	4.82	4.70	+.12	2.49
1948-49a/	4.90	5.06	-.16	-3.27

a/ Preliminary--subject to revision.

Sources of data:
Col. 1: Col. 1, table 1.
Col. 2: Estimated by equation (1) on page 4.
Col. 3: Col. 1 minus col. 2.
Col. 4: Col. 3 as per cent of col. 1.

TABLE 4

Actual and Estimated F.O.B. Prices of
California Canned Peaches, 1924-25 to 1942-43
(Excluding 1941-42 through 1946-47)

Year June through May	Actual price	Estimated price	Difference: col. 1 minus col. 2	Percentage difference: col. 3 as % of col. 1
	1	2	3	4
	dollars per case			per cent
1924-25	4.21	4.39	-.18	-4.28
1925-26	3.78	3.68	+.10	2.65
1926-27	3.68	3.58	+.10	2.75
1927-28	3.17	3.17	0	0
1928-29	3.22	3.18	+.04	1.24
1929-30	4.08	3.94	+.14	3.88
1930-31	2.88	2.93	-.05	-1.74
1931-32	2.55	2.50	+.05	1.96
1932-33	1.97	1.93	+.04	2.03
1933-34	2.31	2.42	-.11	-4.76
1934-35	2.69	2.74	-.05	-1.86
1935-36	2.51	2.55	-.04	-1.59
1936-37	2.66	2.52	+.14	5.26
1937-38	2.98	2.94	+.04	0.69
1938-39	2.30	2.21	+.09	3.91
1939-40	2.44	2.47	-.03	-0.45
1940-41	2.30	2.42	-.12	-5.22
1947-48	4.82	4.70	+.12	2.49
1948-49 a/	4.90	5.06	-.16	-3.27

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